BIRD ELECTRONIC CORP

Model 8813 Termaline

Coaxial Load Resistor

INSTRUCTION BOOK

Installation - Operation - Maintenance

Electronic Maintenance
& Calibration Lab
University of Colorado at Denver
Campus Box 111
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Denver, CO 80217-3364

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Denver
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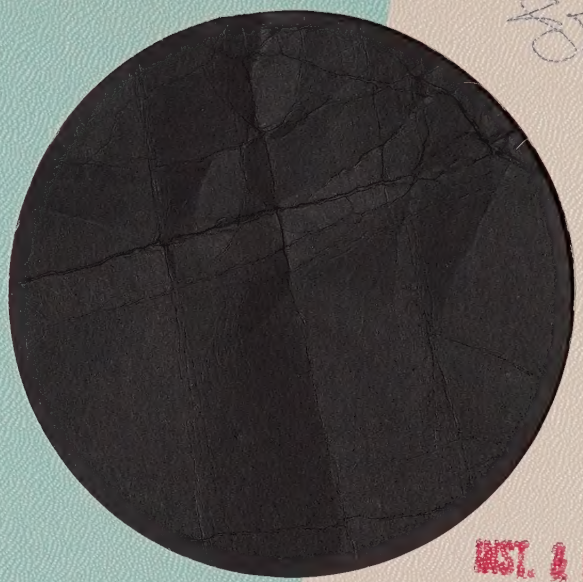

INST. & CAL. LAB

MASTER

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# BIRD

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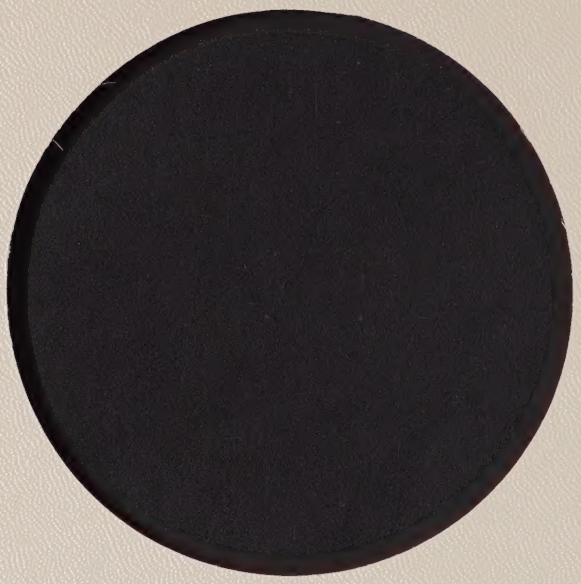

# Instructions
for
INSTALLATION-OPERATION-MAINTENANCE
Model 8813 TERMALINE
Coaxial Load Resistor

## GENERAL

This load resistor is a general purpose coaxial line termination for use with 50 ohm radio frequency transmission lines. It has a continuous load capacity of 1000 watts in normal ambient temperature (up to 45°C) and a frequency range from 0 to approximately 1000 megacycles per second. Under these conditions the Model 8813 therefore provides a low reflection (non-radiating) line termination. This is useful as a substitute antenna to assist in tuning rf transmitters within its range, and for other routine maintenance or special checks on coaxial transmission equipment. The Model 8813 is equipped with 1-5/8 inch flanged type (EIA) input connector. See paragraph on Fittings below for methods of connecting to it.

## ELECTRICAL CHARACTERISTICS

The Model 8813 is designed to match the most common high frequency transmission media; i.e., 50 ohm coaxial lines. The impedance, in the VSWR (voltage standing wave ratio) language of such transmission, is quite independent of frequency and almost purely resistive. VSWR values are maintained below 1.1 up to 1000 mc and the calibration results of this particular resistor are tabulated below. In the frequency region 1000 to 2000 mc, calibration is not normally performed. However, tests on typical units of this equipment show VSWR's to be less than 1.25 in this range. Below 50 mc, the input impedance of the Dummy Load is very nearly a pure resistance to equal to the DC resistance. The production tolerance of the DC resistance on these equipments is held within close limits, and the value for this particular resistor is inscribed in the table below.

Power measurements may be made on the dummy load by insertion of a Bird Model 43* THRULINE Wattmeter on the coaxial input circuit. Using the appropriate measuring Elements, readings can be obtained within the operating range of the Model 8813 (up to 1000 mc).

RESISTANCE and VSWR on Model 8813. Serial No. 345

DC RESISTANCE 50 Ohms

| Frequency | 100 Mc. | 300 Mc. | 500 Mc. | 700 Mc. | 1000 Mc. |
|---|---|---|---|---|---|
| VSWR | | | | | |

VSWR is below 1.25 at frequencies up to 2000 mc.
All VSWR measurements with 50 ohm slotted line.

Max continuous load power - 1000 watts.
Max load for 1/2 hour - 1200 watts.

* Types 4712 or 4715 attach directly to 1-5/8 EIA connectors.

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DESCRIPTION

The Model 8813 equipment consists essentially of a carbon film-on-ceramic resistor immersed in dielectric coolant. The resistor, particularly selected for its uniform accuracy, is enclosed in a specially tapered housing. This provides a reduction in surge impedance directly proportional to the distance along the resistor. When surrounded by the dielectric coolant, the characteristic impedance is therefore 50 ohms at the front, and zero ohms at the rear - where the housing joins the resistor forming the return conductor. This produces the uniform, very low reflectivity line termination over stated frequencies of the load resistor.

The dielectric fluid of the load resistor is chosen for its chemical inactivity (to prevent damage to the resistor), its heat capacity and high flash point, and its low dielectric constant, to which the diameters of the resistor housing are matched. A teflon window provides an insulator which supports the central resistor, while introducing only very slight interruption to the requisite coaxial line impedance. The insulator seals against coolant seepage by use of precise longitudinal compression around its edges, and by a radially compressed O-ring in the perimeter. The outside head of the center conductor (resistor) assembly forms a mount on which the center contact of the 1-5/8 inch 50-ohm coaxial input is sprung.

The outer conductor tube of the flanged connector is rigidly fastened to the resistor housing by means of an externally threaded retaining ring. This retaining screw is tightened at the factory with special tools, and should not be loosened by field personnel, as this will disturb the insulator seal. The outer conductor holds captive a free swivel flange for 1-5/8 inch UHF flanged connector.

Another synthetic rubber O-ring around the outside of the resistor housing mount furnishes a seal for the radiator opening. A beveled flange retains the O-ring. This flange with the O-ring inside is pressed against the radiator face by the resultant action of the drawing up the radial V-clamp band around the radiator and resistor mounting flanges.

When input power is applied, the resistor generates heat in the adjacent coolant oil. By convection, the heated oil flows thru slotted openings in the coaxial shell to the walls of the fabricated metal tank. The series of radiating fins integral to the tank transmit the heat of the dielectric oil into the surrounding air.

INSTALLATION

The TERMALINE Resistor is intended for operation in a horizontal position only. It may be placed loose on an appropriate surface, or permanently fastened in a level position by means of its base mounting flanges. The flanges have four 3/8 diam. holes on a 21-1/4 by 5-3/8 base rectangle, for use with screws up to 5/16-inch size. Position the unit for ample air circulation, allowing at least 6 inches of free air space all around the radiator.

## SPECIAL CAUTION

Do not apply any electrical power (rf load) to the TERMALINE Load Resistor until the Shipping Plug is removed. It is very essential to do this to allow for expansion of the heated dielectric oil. The Plug #245049 is screwed directly inside the adapter at the top and front of the radiator tank. It is painted red on top face and has a 3/4-in. hex flange. Unscrew vent plug with 3/4-in. end wrench. If the equipment should be moved, replace the shipping plug to prevent oil spillage during transit.

Note: When specially ordered, certain units may have an automatic relief type filler installed, Vent Valve #24381. This is identified by the sintered filter disk in the center of the plug. If this filter disk is present, vent plug removal is not necessary.

It is possible to manage power loads greater than 1 KW by use of auxiliary ventilation on the equipment. If an effective fan or blower is placed transverse to the radiator, it may be permissable to increase the load power to approximately 2 KW under the proper conditions.

### OVERLOAD THERMOSWITCH

The Model 8813 is provided with a closed circuit thermoswitch for protection of the Load Resistor against possible overheating. This Thermoswitch should be wired in series with the transmitter interlock. The switch is immersed in the resistor coolant, and will open when the coolant temperature reaches 155°C, cutting off the output power of the transmitter.

To make the interlock connection, unscrew (counter clockwise) the large knurled nut at the face end of the female type plug and pull off the Plug Assembly #245018. Unscrew cable clamp at back of plug and thread over interlock cable. Solder wires to prongs, and reassemble plug securely, tightening clamp to cable with the two transverse screws.

### FITTINGS

The Load Resistor is designed for connection directly to 1-5/8 inch 50-ohm UHF coaxial lines. The center conductor will require an anchor bullet (Communication Prod. #S14840) and the flanges are pulled up with (4) 5/16-in. x 1-1/2 long cap screws with appropriate nuts and washers. Make sure the Load Resistor is kept in even alignment with the coaxial input conductors.

The Model 8813 will also mate directly with the Bird Electronic Model 4712 THRULINE Section. It attaches just the same as the 1-5/8 inch 50-ohm UHF line. With the inclusion of the Model 4712 THRULINE, the Model 8813 "Termaline" may be used as an absorption type wattmeter. This will permit direct reading power measurements within the range and capacity of the THRULINE Measuring Elements used (consult Bird Electronic Company or its catalogs for further information).

### MAINTENANCE

This equipment is rugged and simple, and should require only nominal routine care. Keep the radiator dusted off and the electrical parts free of dirt. If the connector contacts or faces should become dirty, wipe off with a little dry solvent on a cotton swab stick. Inhibisol* or its equivalent is recommended, or trichlorethylene. If carbon tetrachloride is used, exercise caution to avoid fumes.

* A non-toxic, non-flammable dry cleaning agent manufactured by the Penetone Company, Tenafly, New Jersey.

If the Resistor Housing Assy #352020 should need replacement, proceed as follows: To avoid the possibility of coolant spillage, replace Vent Plug #245049 before proceeding. Place the radiator #245003 on its back end (connector up). Then loosen and remove the screw on the clamping band #24355 at the base of the front connector. Remove clamping band and carefully lift out the Resistor Housing unit in a vertical direction, allowing the coolant to drip back into the tank (be sure the radiator unit is properly held).

With the exception of the circumferential O-ring #81139, this Unit is not subject to further disassembly - replace a defective Resistor Housing #352020 in its entirety. Units may be returned to the factory for repair - consult with the company. Do not re-use the O-ring unless it is in very good condition. Before replacing the resistor housing, check that the O-ring is pushed snugly against the inside of the beveled lip around the housing. Also, check the coolant level - it should be four inches below the bare edge of the cylindrical flange when the radiator is on end. Replace the Resistor Housing Assy by reversing the procedure described above. Position the stamp mark "UP" in the proper place, and tighten the #10-32 clamping screw securely - making sure that the clamping band is on evenly. Then restore the Load Resistor to a horizontal position, and inspect carefully for coolant leakage. Before using equipment, reopen the Vent Plug, and if deemed necessary recheck the coolant level - see Coolant Section below.

COOLANT

The Dummy Load is factory filled to the proper coolant level (with GE 10C Transil Dielectric Oil) at room temperature. Expansion of the coolant with rise in temperature is taken care of by means of the vent plug previously discussed. The coolant level should be about 2-$\frac{1}{4}$ to 2-$\frac{1}{2}$ inches below the top face of the filler hole. Under normal conditions there should be very little loss of coolant. Reasonable amounts of fluid loss will not seriously reduce the capacity of the equipment.

List of Replaceable Parts

| Qty | Part No. | Name | |
|---|---|---|---|
| 1 | 245003 | Radiator | |
| 1 | 245049 | Plug (shipping) | |
| 1 | 5131 | O-Ring, Plug | |
| 1 | 245040 | Thermoswitch | |
| 1 | 245018 | Connector Assy, Thermoswitch | |
| 1 | 352020 | Resistor Housing Assy | |
| 1 | 81139 | O-Ring, Resistor Hsg. | Linear #11-242 |
| 1 | 24355 | Band, Clamping (w/screw) | |
| (1)* | 24381 | Plug, Vent Valve | |
| (1)* | 5244 | O-Ring, Vent Plug | |
| | | *Note - these two items are present only when specially procured, and replace the Plug #245049 and O-Ring #5131 above. | |
| - | Std. | 1.7 Gal. GE 10C Transil Oil | |

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ELECTRICAL ENG.

INST. & CAL. LAB

Model 8813 TERMALINE

Coaxial Load Resistor

INSTALLATION - OPERATION
MAINTENANCE

Serial No. 345
CU 10821

ELECTRONIC RESEARCH LABORATORIES, INC.
ATLANTIC & FERRY AVE. CAMDEN, N.J. 08104

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